IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

APPEAL BRIEF FOR THE APPELLANT

Ex parte Tuomo LEHTONEN

July 12, 2006

10/774,695
Serial No. ~~10/744,695~~
Appeal No.:
Group Art Unit: 2856

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David E. Brown
Attorney for Appellant(s)
Reg. No. 51,091

SQUIRE, SANDERS & DEMPSEY LLP
8000 Towers Crescent Drive, 14th Floor
Tysons Corner, VA 22182-2700

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Encls: Check Nos. 14708 and 14717
Appeal Brief
Petition for Extension of Time

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Appellant:

Tuomo LEHTONEN | Appeal No.:

Serial Number: 10/774,695 | Group Art Unit: 2856

Filed: February 10, 2004 | Examiner: Kwok, Helen C.

For: CAPACITIVE ACCELERATION SENSOR

BRIEF ON APPEAL

July 12, 2006

I. INTRODUCTION

This is an appeal from the final rejection set forth in an Office Action dated October 5, 2005, finally rejecting claims 1 and 3-17, all of the claims pending in this application. In the Office Action, the Examiner rejected claims 1, 3-11, and 15-17 as being anticipated by Menzel (U.S. Patent No. 6,000,287) and claims 12-14 as being unpatentable over Menzel, in view of Reddi, et al. (U.S. Patent No. 5,831,164). A Request for Reconsideration was timely filed on January 5, 2006. An Advisory Action was issued on April 11, 2006, indicating that the Request for Reconsideration was considered but that it did not place the application in condition for allowance. A Notice of Appeal and Pre-Appeal Brief Request for Review were timely filed on March 27, 2006 with petition for Extension of Time. This Appeal Brief is being timely filed.

II. REAL PARTY IN INTEREST

The real parties in interest in this application are VTI Technologies OY of Vantaa,

Finland, by virtue of an Assignment which was submitted for recordation on July 6, 2004, and which was recorded at Reel 01555, Frame 0294, on July 9, 2004.

III. STATEMENT OF RELATED APPEALS AND INTERFERENCES

There are no known related appeals and/or interferences which will directly effect or be directly effected by or have a bearing on the Board's decision in this appeal.

IV. STATUS OF CLAIMS

Claims 1 and 3-17, all of the claims pending in the present application, are the subject of this appeal. Claim 2 is cancelled without prejudice. Claims 1 and 3-11 and 15-17 stand rejected under 35 U.S.C 102(e) as being anticipated by US Patent No. 6,000,287 to Menzel and claims 12-14 stand rejected as being obvious over Menzel, in view of US Patent No. 5,831,164 to Reddi. The PTO's rejections of claims 1 and 3-17 set forth in the Final Office Action dated October 5, 2005 is being appealed.

V. STATUS OF AMENDMENTS

The claims were last amended in the Response filed on July 8, 2005. No amendments to the claims have been filed subsequent to the July 8, 2005 Response.

VI. SUMMARY OF CLAIMED SUBJECT MATTER

The object of the present invention is to provide a sensor structure, which improves the capacitance sensitivity of a pair of electrodes based on rotational motion, and to measure acceleration with good performance in capacitive acceleration sensor

designs.

Claim 1, from which claims 3-17 depend recites a capacitive acceleration sensor: See for example, Fig. 3 and paragraph [0044] and Fig. 4 and paragraph [0052] .

The capacitive acceleration sensor includes at least one pair of electrodes: See Fig 3 elements 5 and 6 and Fig. 4 elements 8 and 9, such that each pair of electrodes includes a movable electrode: See for example, Fig. 3 element 5 and Fig. 4 element 8, and paragraphs [0044] and [0052].

In the capacitive acceleration sensor, the pair of electrodes is responsive to the acceleration and at least one stationary plate portion: See for example Fig. 3 element 6, and paragraph [0044] and Fig. 4 element 9, paragraph [0052].

In the capacitive acceleration sensor, each pair of electrodes (see for example Fig. 3 elements 5 and 6 and fig. 4 elements 8 and 9) further includes an axis of rotation: See for example Figure 3, element 7 and paragraph [0044], and Fig. 4 (the line between elements 10 and 11), paragraph [0052].

In the capacitive sensor essentially a common axis is essentially formed (see for example paragraph [0045]), such that the movable electrode (for example Figure 3, element 5 and Figure 4 element 8)of the acceleration sensor is rigidly supported at the axis of rotation: See for example see Fig. 4 elements 10 and 11.

The movable electrode is free to turn in a rotational motion about the axis of rotation: See for example paragraphs [0045] and [0052].

In the capacitive sensor, the capacitance change between the movable electrode in rotational motion and the plate portion is enhanced by means of the electrodes: See for example paragraph [0046] – [0047].

In the capacitive sensor the capacitance change between the movable electrode in rotational motion and the plate portion is enhanced by means of the shape of the electrodes. See for example paragraphs [0048] and [0051] and Fig. 5 elements 12, 13 and 14, paragraphs [0054 – [0055].

VII. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The PTO's rejection of claims 1 and 3-11 and 15-17 over US Patent No. 6,000,287 to Menzel and the rejection of claims 12-14 to Menzel in view of Reddi, set forth in the Final Office Action dated October 5, 2005 is being appealed.

VIII. APPELLANT'S ARGUMENTS

Applicants respectfully submit that Menzel fails to disclose or suggest all of the features recited in any of the pending claims, at least for the reasons set forth below.

The Final Office Action rejected claims 1 and 3-11 and 15-17 as being anticipated by US Patent No. 6,000,287 to Menzel (Menzel). This rejection is respectfully traversed. Claim 1, from which claims 3-17 depend, recites a capacitive acceleration sensor including at least one pair of electrodes such that each pair of electrodes includes a movable electrode, which is responsive to the acceleration, and at least one stationary plate portion, wherein each pair of electrodes further includes an axis of rotation essentially forming a common axis such that the movable electrode of the acceleration sensor is rigidly supported at the axis of rotation such that the movable electrode is free to turn in a rotational motion about the axis of rotation. Further, in the capacitive

acceleration sensor, a capacitance change between the movable electrode in rotational motion and the plate portion is enhanced by means of the electrodes. In the capacitive sensor, the capacitance change between the movable electrode in rotational motion and the plate portion is enhanced by means of the shape of the electrodes.

In rejecting claims under 35 U.S.C. §102, a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described in a single prior art reference. Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

Applicants respectfully submit that the Office Action failed to establish a prima facie case for anticipation because the cited reference fails to disclose or suggest all of the features of any of the pending claims.

1. Claim 1

Applicants respectfully submit that the cited reference fails to disclose or suggest at least the feature that the capacitance change between the movable electrode in rotational motion and the plate portion is enhanced by means of the shape of the electrodes, as recited in claim 1.

Menzel is directed to a capacitor center of area sensitivity in angular motion micro-electromechanical systems. The microaccelerometer includes a stationary plate electrode and a moveable plate electrode substantially parallel with the stationary plate electrode. The movable plate electrode rotates through a dielectric fluid about an axis of rotation parallel to the stationary plate electrode in response to acceleration. The center of area of the stationary plate is changed relative to the movable plate to obtain a particular sensitivity. Thus, in Menzel the length of the stationary electrode is adjusted in

order to determine the desired sensitivity. Further, Menzel only discloses rectangular-shaped electrodes, see column 1 line 66 – column 2 line 8.

As stated above, a feature of the present invention is that the shape of the electrodes enhances the sensitivity of the sensor. While the premise of Menzel is that the size of the electrode is adjusted to determine the desired sensitivity, Applicants submit that this is different than changing the shape of the electrode to enhance sensitivity. For example, if the size of a rectangular electrode is changed, it remains a rectangle and does not become a triangle-shape, or a tear-drop shape due to its change in size. In other words, the shape remains rectangular.

The differences between shape and size of the electrodes of a sensor as well as the effects of each on the sensitivity of the sensor are further illustrated in Figure 5 of the present invention. As shown in Fig. 5, of the present application, curve 13 depicts the best possible change, expressed in percentages, in the capacitance of an ordinary pair of electrodes with surfaces of rectangular shape (see paragraph [0054] of the present specification). Thus, using the redimensioning methods such that described in Menzel, the sensitivity of a rectangular shaped sensor can be adjusted below curve 13, or at most on curve 13. This level of sensitivity is inferior to the sensitivity of a pair of electrodes in the triangle shape. This increased sensitivity is shown as curve 14 of Figure 5 of the present invention and described in paragraph [0055] of the present invention. Thus, as discussed above, the shape of the electrodes as claimed in the present invention, influences the sensitivity of the sensor.

Further, for the sake of argument only, even if both the present invention and Menzel seek to adjust or enhance the level of sensitivity of a sensor by means of

adjusting the electrodes (not admitted), Applicants submit that changing the size of the electrode does not anticipate changing the size of the electrode, as alleged in the Office Action because as discussed above, the change of shape has a superior effect on the sensitivity of the sensor, than would the change of size.

In the present invention, the effect of the shape of the electrode is an integral feature that is recited in claim 1. It is established in US case law that a shape of an element of a claim is distinct if the shape of the element in question has a particular function, and that a change in shape that has a related function, is an inventive step. For example, see Northpoint Technology Inc. v. MDS America Inc., 413 F.3d 1301, 1305, 75 U.S.P.Q. 2d 1244 (Fed. Cir. 2005). As recited in the dependent claims discussed below and shown in the Figures, the present invention emphasizes the effect on the sensitivity of the electrodes as a function of the shape of the electrodes and not on the resizing or redimensioning of the sensor electrodes.

Regarding dependent claims 3-11 and 15-17, the Applicant respectfully submits that Menzel is deficient at least for the same reasons discussed above regarding claim 1, as well as for the additional features recited in these dependent claims.

2. Claim 3

Claim 3, depends from claim 1 and recites additional features. It is respectfully submitted that the features recited in claim 3 are neither disclosed nor suggested in Menzel.

3. Claim 4

Claim 4 depends from claim 1 and recites additional features. It is respectfully submitted that the features recited in claim 4 are neither disclosed nor suggested in

Menzel.

4. Claim 5

Claim 5, depends from claim 1 and recites additional features. It is respectfully submitted that the features recited in claim 5 are neither disclosed nor suggested in Menzel.

5. Claim 6

Claim 6 depends from claim 1 and recites additional features. It is respectfully submitted that the features recited in claim 6 are neither disclosed nor suggested in Menzel.

6. Claim 7

Claim 7 depends from claim 1 and recites additional features. It is respectfully submitted that the features recited in claim 7 are neither disclosed nor suggested in Menzel.

7. Claim 8 depends from claim 1 and recites additional features. It is respectfully submitted that the features recited in claim 7 are neither disclosed nor suggested in Menzel.

8. Claim 9

Claim 9 depends from claim 1 and recites additional features. It is respectfully submitted that the features recited in claim 9 are neither disclosed nor suggested in Menzel.

9. Claim 10

Claim 10 depends from claim 1 and recites additional features. It is respectfully submitted that the features recited in claim 10 are neither disclosed nor suggested in

Menzel.

10. Claim 11

Claim 11 depends from claim 1 and recites additional features. It is respectfully submitted that the features recited in claim 11 are neither disclosed nor suggested in Menzel.

11. Claim 15

Claim depends from claim 1 and recites additional features. It is respectfully submitted that the features recited in claim 15 are neither disclosed nor suggested in Menzel.

12. Claim 16

Claim 16 depends from claim 1 and recites additional features. It is respectfully submitted that the features recited in claim 16 are neither disclosed nor suggested in Menzel.

13. Claim 17

Claim 17 depends from claim 1 and recites additional features. It is respectfully submitted that the features recited in claim 17 are neither disclosed nor suggested in Menzel.

The Final Office Action rejected claims 12-14 under 35 U.S.C. 103(a) as being obvious as being unpatentable over Menzel, in view of U.S. Patent No. 5,831,164 Reddi, et al. (Reddi). The Office Action took the position that Menzel disclosed all of the features of these claims except for the feature of the sensors formed in the shapes of a triangle, a drop and a hammer. The Office Action asserted that Reddi disclosed this feature. Applicants respectfully submit that the cited references taken individually or in

combination, fail to disclose or suggest all of the features of these claims. Specifically, Applicants submit that Menzel is deficient at least for the reasons discussed above, and Reddi fails to cure these deficiencies.

In order to establish prima facie obviousness, each claim element must teach or suggest all the claim limitations. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Claim 12 depends from claim 1 and recites the feature of the pair of electrodes is shaped in the shape of a triangle. Applicants respectfully submit that the cited references, taken individually or in combination, fail to disclose or suggest all of the features recited in claim 12.

Claim 13 depends from claim 1 and recites the feature of the pair of electrodes is shaped in the shape of a drop. Applicants respectfully submit that the cited references, taken individually or in combination, fail to disclose or suggest all of the features recited in claim 13.

Claim 14 depends from claim 1 and recites the feature of the pair of electrodes is shaped in the shape of a hammer. Applicants respectfully submit that the cited references, taken individually or in combination, fail to disclose or suggest all of the features recited in claim 14.

Reddi is directed to a linear and rotational accelerometer. In Reddi, a two degree of freedom (2 DOF) accelerometer comprising two imbalanced sensing modules (i.e., bar modules having an unbalance) is provided such that two sensing modules are located in the plane to be measured. The two imbalanced sensing modules have force balance and are used to measure linear and angular accelerations in two degrees of freedom. A single

modular design is used for both of the axes. Each of the two individual sensing modules has a housing containing a proof mass for each measured output and a support of the proof mass with the support optimized for the sensitive axis selected for sensor output and having high rigidity in all other axes of the support. Reddi is relied upon to suggest the feature that a pair of electrodes may be of any shape. The Office Action cites column 6 lines 30-31 of Reddi. However, Reddi fails to disclose or suggest at least the feature that the capacitance change between the movable electrode in rotational motion and the plate portion is enhanced by means of the shape of the electrodes. Therefore, Reddi fails to cure the deficiencies of Menzel.

Based at least on the above, Applicants respectfully submit that the cited references taken individually or in combination, fail to disclose or suggest all of the features of claims 12-14 and therefore the Final Office Action failed to establish prima facie obviousness in rejecting claims 12-14. Accordingly, withdrawal of the rejection under 35 U.S.C. 103(a) of claims 12-14 is respectfully requested.

IX. CONCLUSION

For all of the above noted reasons, it is strongly contended that certain clear differences exist between the present invention as claimed in claims 1 and 3-17 and the prior art relied upon by the Examiner. It is further contended that these differences are more than sufficient that the present invention would not have been obvious to a person having ordinary skill in the art at the time the invention was made.

This final rejection being in error, therefore, it is respectfully requested that this honorable Board of Patent Appeals and Interferences reverse the Examiner's decision in

this case and indicate the allowability of application claims 1 and 3-17.

In the event that this paper is not being timely filed, the applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension together with any additional fees which may be due with respect to this paper may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,

SQUIRE, SANDERS & DEMPSEY LLP

David E. Brown
Attorney for Applicant(s)
Registration No. 51,091

Atty. Docket No.: 59244.00008

8000 Towers Crescent Drive, 14th Floor
Tysons Corner, VA 22182-2700
Tel: (703) 720-7800
Fax (703) 720-7802

DEB:jkm

Encls: Appendix 1 - Claims on Appeal
Appendix 2 - Drawings

APPENDIX 1

CLAIMS ON APPEAL

1. (Previously Presented) A capacitive acceleration sensor comprising at least one pair of electrodes such, that each pair of electrodes comprises a movable electrode, which is responsive to the acceleration, and at least one stationary plate portion, wherein each pair of electrodes further comprises an axis of rotation essentially forming a common axis such, that

- the movable electrode of the acceleration sensor is rigidly supported at the axis of rotation such, that the movable electrode is free to turn in a rotational motion about the axis of rotation, and that

- a capacitance change between the movable electrode in rotational motion and the plate portion is enhanced by means of the electrodes,

wherein the capacitance change between the movable electrode in rotational motion and the plate portion is enhanced by means of the shape of the electrodes.

2. (Cancelled)

3. (Previously Presented) The capacitive acceleration sensor of Claim 1, wherein the pair of electrodes is shaped by means of the movable electrode such, that a significant portion of the area of the pair of electrodes is situated as far away as possible from the axis of rotation of the movable electrode.

4. (Previously Presented) The capacitive acceleration sensor of Claim 1, wherein the pair of electrodes is shaped by the at least one stationary plate portion such, that a significant portion of the area of the pair of electrodes is situated as far away as possible from the axis of rotation of the movable electrode.

5. (Previously Presented) The capacitive acceleration sensor of Claim 1, wherein the pair of electrodes is shaped by means of the movable electrode and the at least one stationary plate portion such, that a significant portion of the area of the pair of electrodes is situated as far away as possible from the axis of rotation of the movable electrode.

6. (Original) The capacitive acceleration sensor of Claim 1, wherein the movable electrode has essentially two support points with associated springs providing a degree of freedom of rotation for the movable electrode about the axis of rotation.

7. (Previously Presented) The capacitive acceleration sensor of Claim 6, wherein the movable electrode is supported by torsion springs close to an edge of the movable electrode.

8. (Original) The capacitive acceleration sensor of Claim 6, wherein the movable electrode is supported by torsion springs at separate projections.

9. (Previously Presented) The capacitive acceleration sensor of Claim 6, wherein the movable electrode is supported at an interior of the movable electrode by torsion springs.

10. (Original) The capacitive acceleration sensor of Claim 6, wherein the movable electrode is supported by springs, having degrees of freedom of bending and rotation of equal order of magnitude.

11. (Original) The capacitive acceleration sensor of Claim 6, wherein the movable electrode has at least three support points, two of which are essential support points.

12. (Original) The capacitive acceleration sensor of Claim 1, wherein the pair of electrodes is shaped in the shape of a triangle.

13. (Original) The capacitive acceleration sensor of Claim 1, wherein the pair of electrodes is shaped in the shape of a drop.

14. (Original) The capacitive acceleration sensor of Claim 1, wherein the pair of electrodes is shaped in the shape of a hammer.

15. (Original) The capacitive acceleration sensor of Claim 1, wherein the capacitance change between the movable electrode in rotational motion and the plate portion is enhanced by means of a coating on the electrodes.

16. (Original) The capacitive acceleration sensor of Claim 1, wherein the capacitance change between the movable electrode in rotational motion and the plate portion is enhanced by having a larger electron gap between the electrodes.

17. (Previously Presented) The capacitive acceleration sensor of Claim 1, wherein the capacitive acceleration sensor comprises a stationary electrode on the opposite side of said movable electrode.

APPENDIX 2

DRAWINGS OF APPLICATION SERIAL NO. 10/774,695

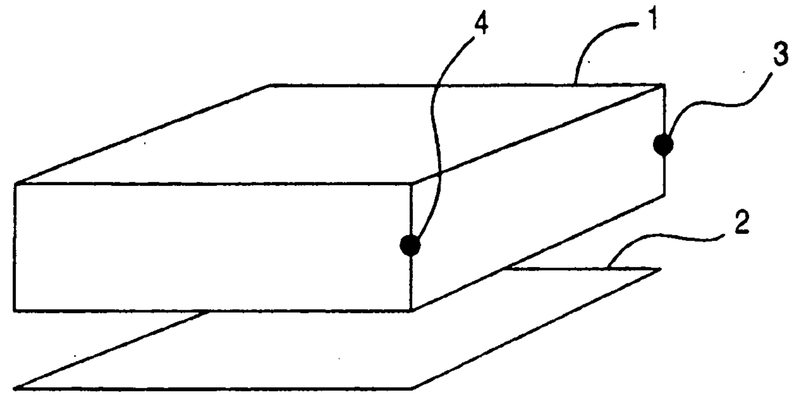

Fig. 1
PRIOR ART

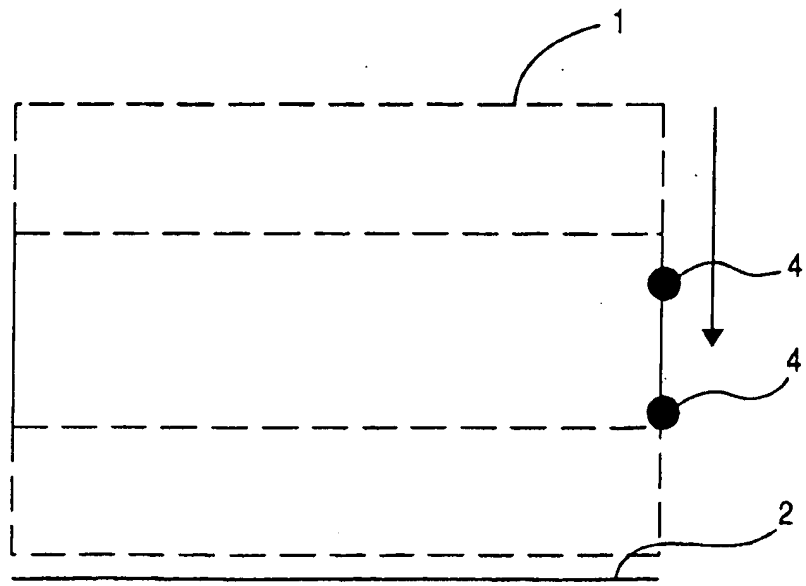

Fig. 2
PRIOR ART

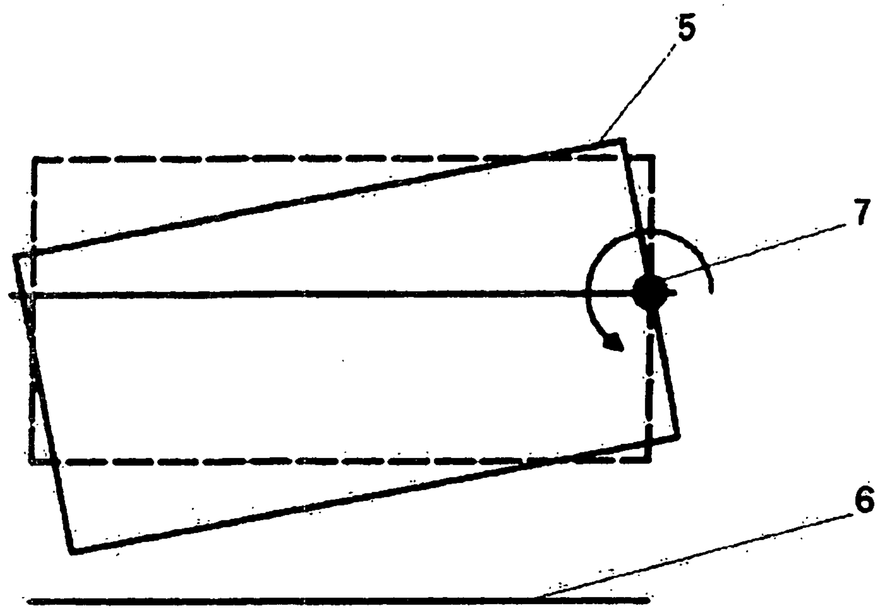

Fig. 3

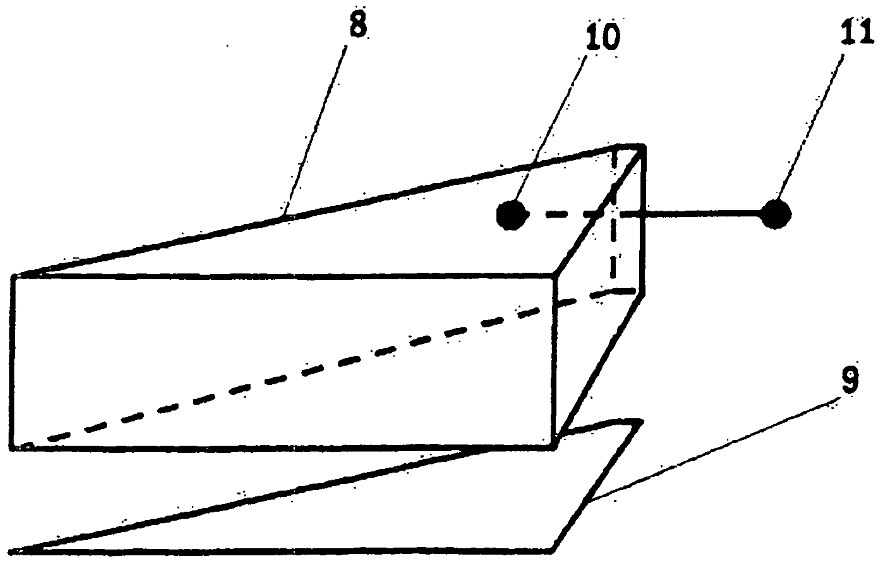

Fig. 4

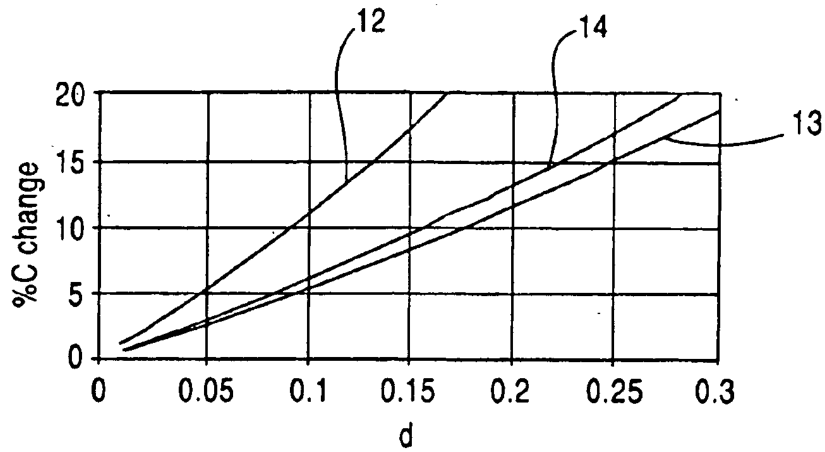

Fig. 5

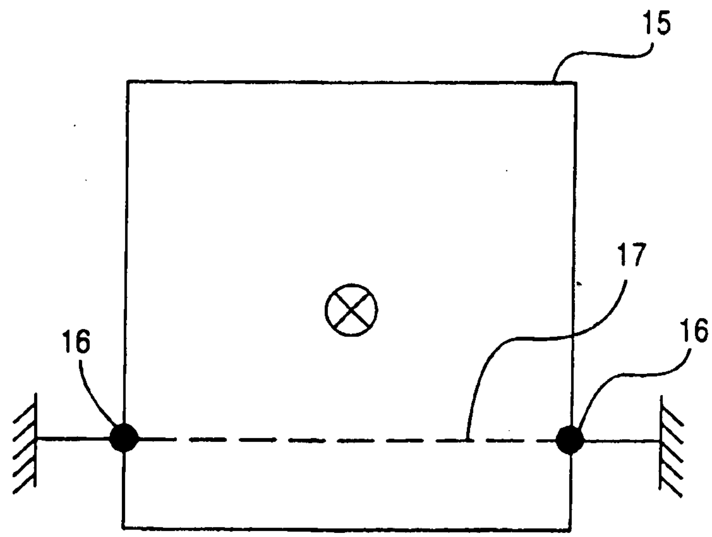

Fig. 6

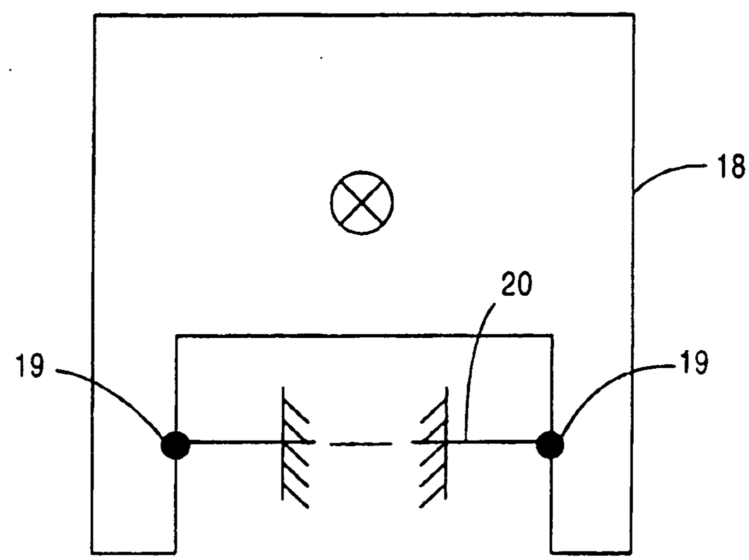

Fig. 7

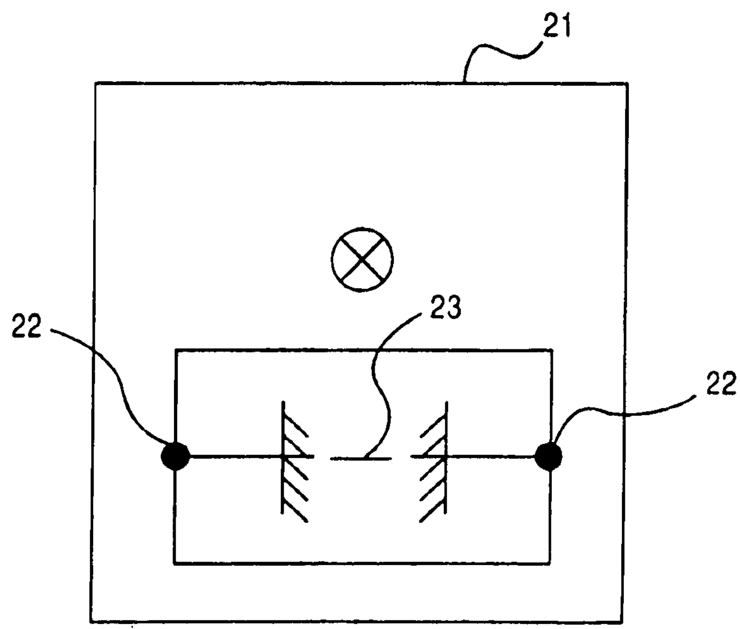

Fig. 8

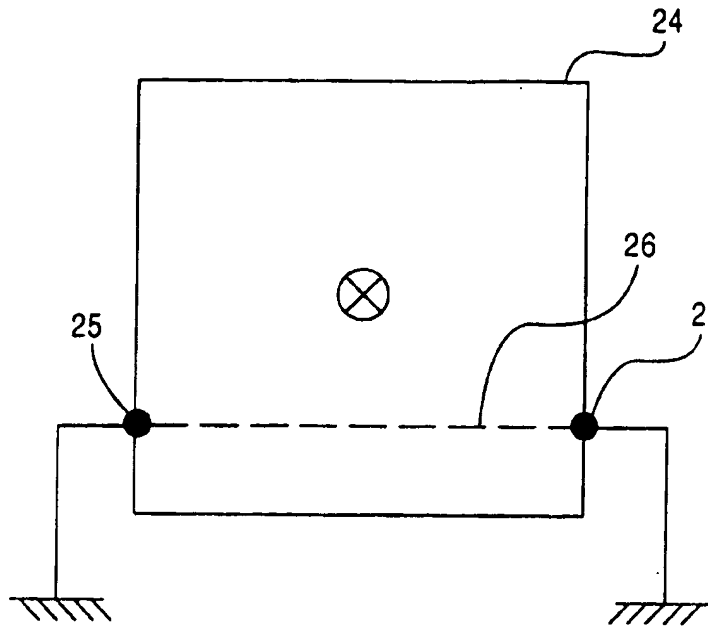

Fig. 9

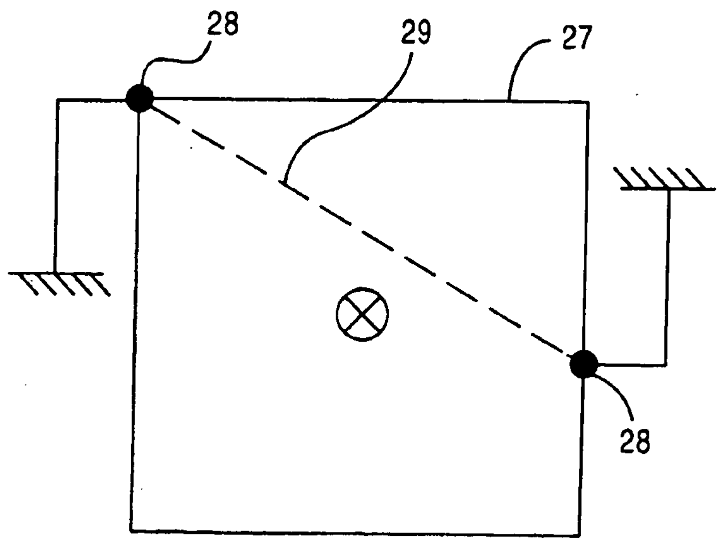

Fig. 10

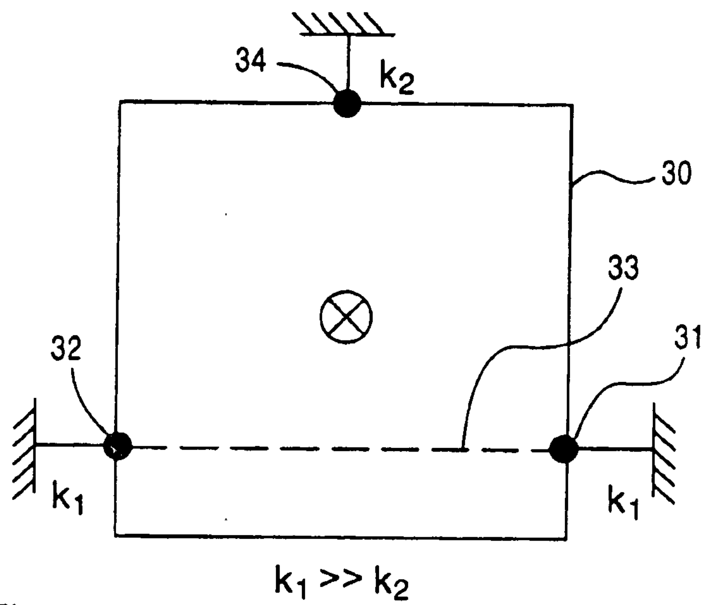

Fig. 11

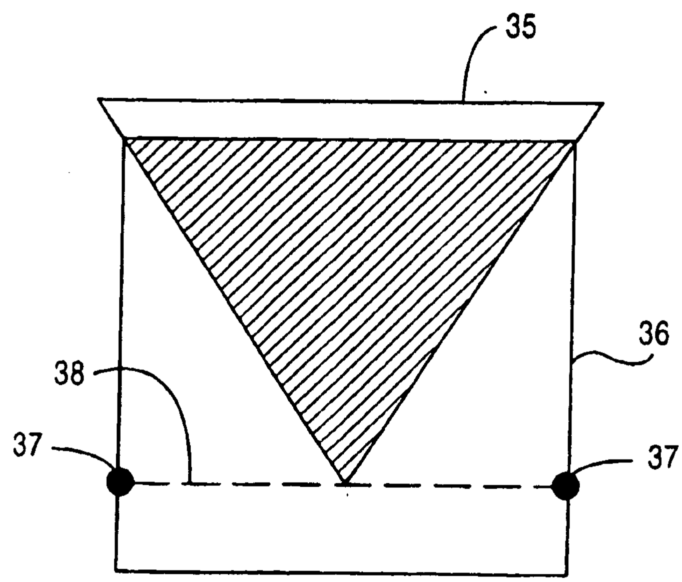

Fig. 12

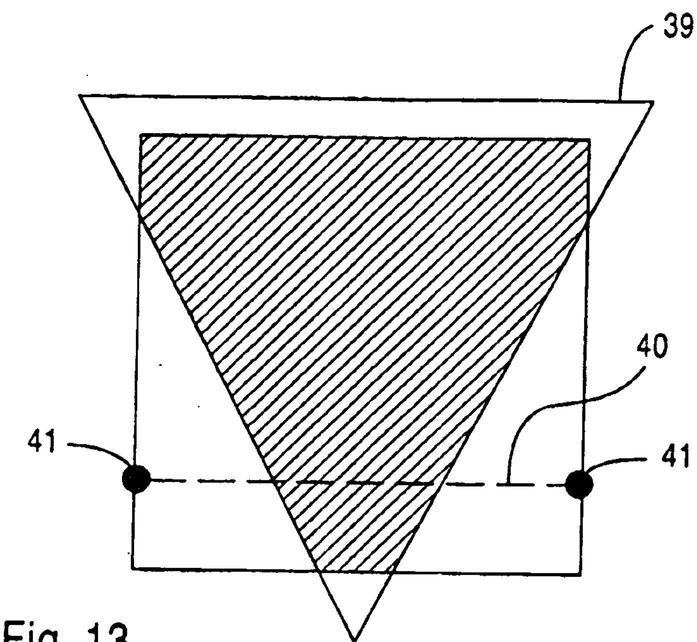

Fig. 13

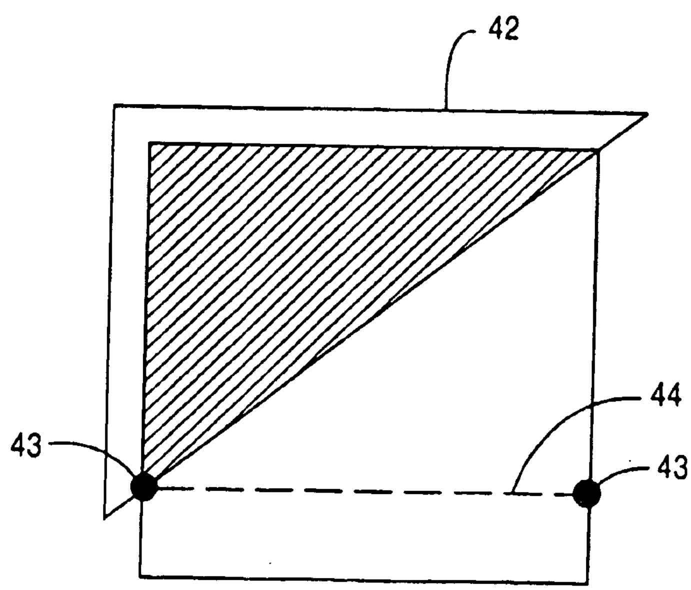

Fig. 14

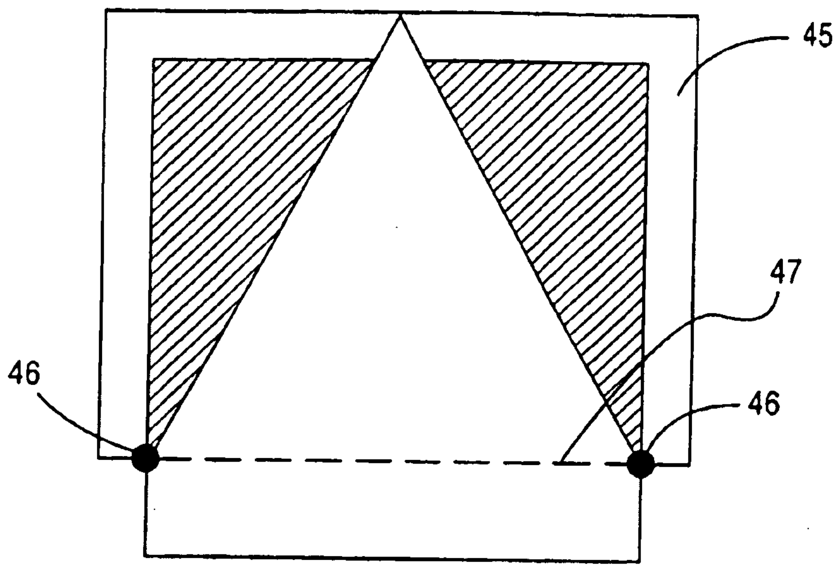

Fig. 15

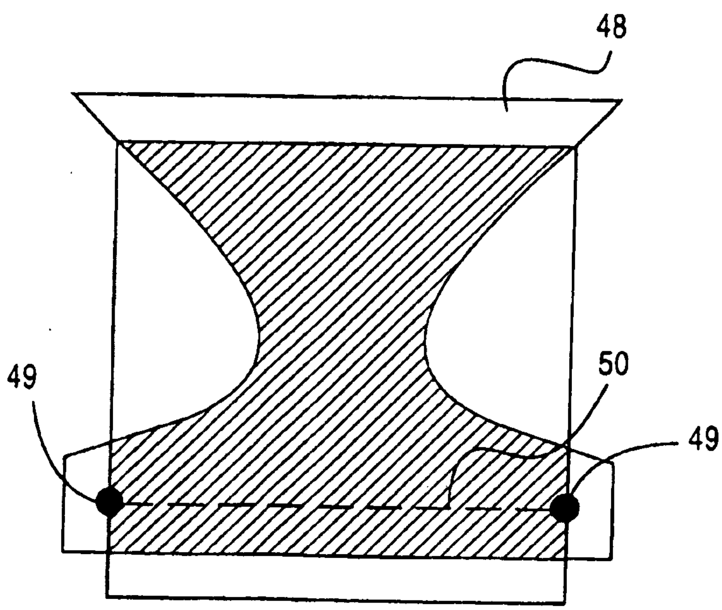

Fig. 16

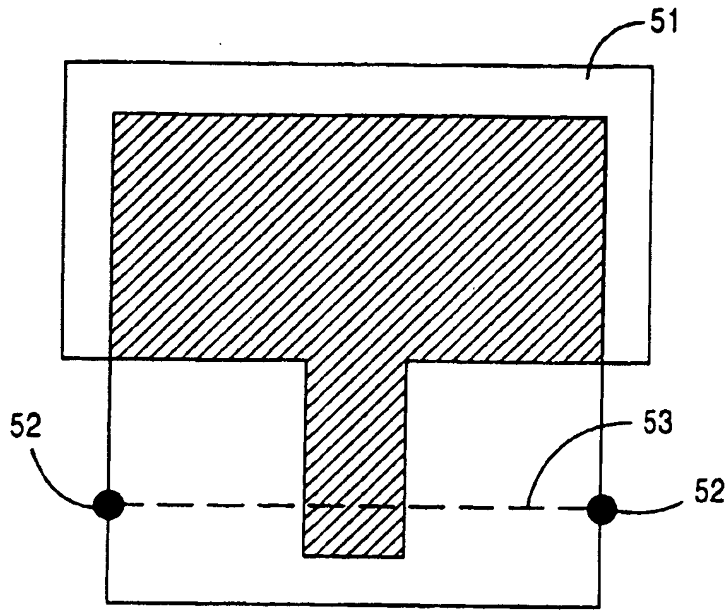

Fig. 17

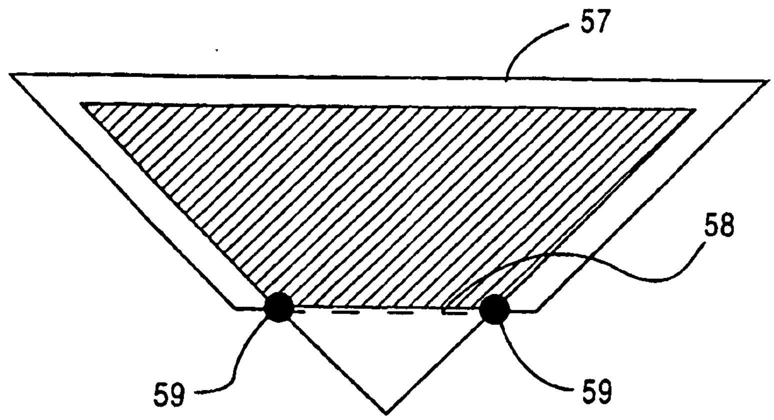

Fig. 19

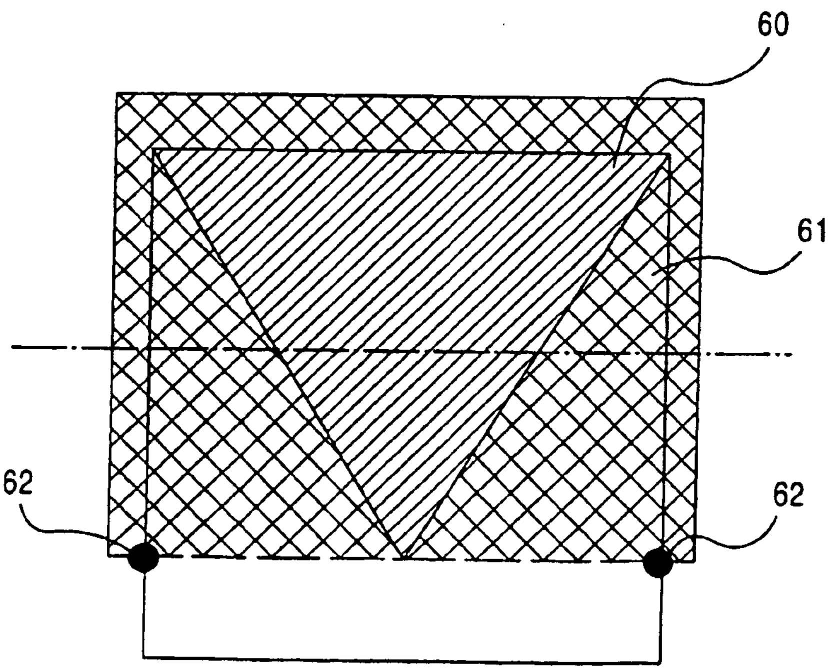

Fig. 20

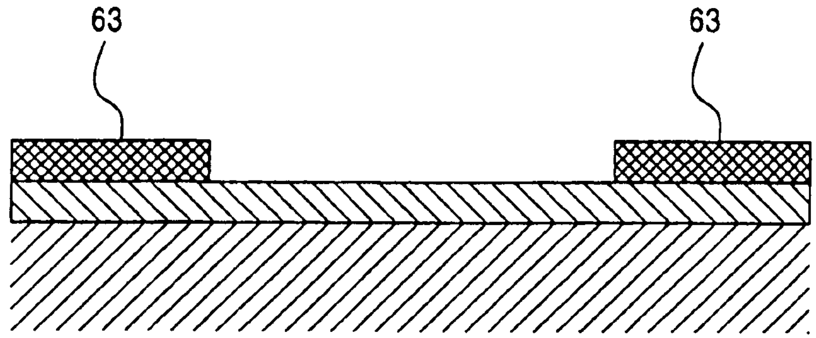

Fig. 21

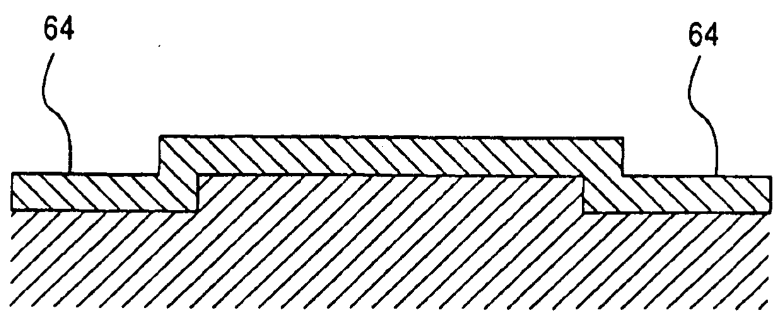

Fig. 22